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U. S. DEPARTMENT OF AGRICULTURE,
FOREST SERVICE.

HENRY S. GRAVES, FORESTER.

HANDBOOK FOR CAMPERS
IN THE NATIONAL FORESTS
IN CALIFORNIA.

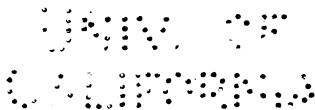


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CONTENTS.

	Page.
Foreword.....	3
The Forest regions.....	4
National Forests in California.....	6
How the Forests are administered.....	8
Individual National Forests.....	9
Klamath.....	9
Trinity.....	12
California.....	13
Shasta.....	13
Modoc.....	14
Lassen.....	14
Plumas.....	15
Tahoe.....	15
Eldorado.....	16
Stanislaus.....	17
Sierra.....	17
Sequoia.....	18
Mono.....	19
Inyo.....	19
Monterey.....	19
Santa Barbara.....	20
Angeles.....	20
Cleveland.....	21
Outfit.....	21
Clothing, etc.....	21
Camp equipment.....	22
Rations.....	23
Camp fires.....	24
Camp cookery.....	27
Disposal of refuse.....	31
Packing.....	31
Slinging.....	32
The hitch.....	33
Accidents—First aid.....	37
Fires and fire fighting.....	39
Hints on fire protection.....	44
Game and fish.....	45
Miscellaneous.....	47



HANDBOOK FOR CAMPERS IN THE NATIONAL FORESTS IN CALIFORNIA.

FOREWORD.

California contains a great number and variety of fine camping places. Most of these are in the mountains and within the boundaries of the National Forests. This is an advantage so far as camping is concerned, for the development of the National Forests, to perpetuate the timber supply and protect stream flow, has incidentally increased their attractiveness for recreation purposes. Roads and trails built by the Government are open to the public and make many regions available for camping that were formerly inaccessible. Telephone lines built in order to enable lookouts to report fires promptly and the rangers to summon fire crews without loss of time connect the most remote portions of the Forests with the outside world and can be used for the transmission of important private messages. At many Forest stations campers' registers are kept for the convenience of the public.

No restrictions on camping are imposed by the Government except those that a reasonably considerate camper would impose upon himself. Care with fire is, of course, essential. In some localities campers are urged to use fireplaces prepared by the rangers in attractive camping sites; and on one Forest, the Angeles—because of the extreme inflammability of the cover—campers are required to secure permits before building fires. On all the Forests, without exception, camp fires must be totally extinguished before being left.

Streams must not be polluted and camps must be kept in sanitary condition and left in good order. At many camp sites

the Forest Service provides tools to keep the camp clean and to cover the camp fire with earth before leaving. These should be used and afterward replaced.

Saddle and pack animals used by campers may be grazed without fee. In places where the forage needed by campers' stock is likely to be consumed by commercial stock grazed under permit, special pastures are provided for the former.

Firearms¹ are permitted, and there are no restrictions regarding hunting or fishing except those imposed by the State fish and game laws. In cooperation with the California Fish and Game Commission, hundreds of mountain streams and lakes have been stocked with suitable species of game fish.

The best hunting and fishing grounds are known to the local forest officers, and campers should not hesitate to apply to them for information.

Maps are published of many of the National Forests, showing in some detail the roads, trails, and streams, and giving information regarding distances, camping grounds, etc. These maps may be obtained free on application at any Forest Service office.

Many persons would like to go camping, but do not know how to get started, where to go, or what to take. It is the purpose of this booklet to furnish general suggestions that may help such persons to make themselves comfortable in camp. A camper who has acquired some experience in woodcraft is in a position to have a much more enjoyable time than one entirely without knowledge of life in the open and, in addition, to be a source of protection instead of danger to the Forests.

THE FOREST REGIONS.

The forests in different parts of the State differ greatly in character. In southern California, even at comparatively high elevations, the slopes of the mountains facing the desert carry

¹ National Forests should not be confused with national parks. Firearms are prohibited in the latter.

only the scantiest vegetation, consisting largely of desert species, only the canyons being shaded by sparse growths of cottonwood, sycamore, etc. On the other hand, along the northern coast is the redwood forest, one of the densest and most imposing in all the world. Here the trees reach a height of more than 300 feet and a diameter of 20 feet, and stand so close that only ferns and other shade-enduring plants can grow beneath them. Between these two extremes are all the gradations that make the forests of California so interesting and valuable. And since the character of the forest in a particular region is an index of the camping conditions to be found there, the prospective camper should know where the different kinds of forests are located in order to make intelligent selection of a camping place.

In California the forests are as a general thing confined to the mountains and usually at the middle or higher elevations. Along the north coast the redwood forests occur at low altitudes, but throughout the rest of the State the climatic conditions necessary for the native species are found only in the uplands, and the character of the forest changes according to the elevation.

The principal mountain chains are the Coast Range, which roughly parallels the shore line throughout the length of the State, and the Sierra Nevada Range, which extends two-thirds the length of the State from the Oregon line southward to the Tehachapi. Between these ranges lies the great central valley, the northern end of which is drained by the Sacramento River and the southern by the San Joaquin. East and south of the Sierras are the depressions known as the Mojave and Colorado Deserts, portions of which are below sea level.

The highest and lowest points in the United States are in California, only a short distance apart. Death Valley, in Inyo County, lies 427 feet below sea level, while the summit of Mount Whitney, a few miles westward, rises from the crest of the Sierras to a height of 14,502 feet.

The rain and snow fall occur for the most part during the winter months. From June to September occasional thunderstorms occur in the mountains, but they are of short duration; and it is possible to camp in comfort with only the crudest shelter. After storms the atmosphere soon becomes dry, and the summer showers do little toward making the forests less inflammable.

During the winter the snowfall in parts of the mountains is extremely heavy.

NATIONAL FORESTS IN CALIFORNIA.

The National Forests in California include within their boundaries the forests on both slopes of the Sierras from the Oregon line to the Tehachapi, the Klamath River mountains, the interior ridges of the northern Coast Range as far south as Lake County, and the coast ranges from near Monterey southward to the Mexican boundary. The coast redwood belt passed from Government ownership into private hands before Congress authorized the creation of the National Forests.¹

Within the National Forests are four principal belts or zones of forest vegetation which lie, one above the other, on the slopes of the mountains. At the lowest levels is a noncommercial forest consisting of white oaks and digger pine growing in very open stands, with ground cover either of grass or of chaparral of various species. In the northern part of the State the

¹ In order to preserve a portion of the redwood forest for the benefit of posterity, the State of California purchased from private owners a tract of redwood in Santa Cruz County known as the Big Basin. This is managed by a commission appointed by the governor. The Muir Woods, a small but very wonderful redwood forest on the southern slope of Mount Tamalpais, was donated to the nation as a national monument by Mr. William Kent. Neither of these tracts is a National Forest, although the latter is owned by the Government. They are managed, not like National Forests, but solely with the view of preserving and developing their scenic features.

upper limit of this zone is about 2,000 feet elevation. In the southern Sierras it extends up to about 4,000 feet, and in southern California somewhat higher.

Above this foothill zone is the principal belt of commercial timber. It lies between elevations of 2,000 and 6,000 feet at the north, gradually increasing in elevation southward. Sugar pine and yellow pine are its principal species, associated with incense cedar, Douglas fir, white fir, and a few hardwoods like black oak at the lower elevations.

A fir zone occurs above the yellow pine, and still higher up a scanty, wind-swept forest of the hardiest alpine species occupies the more sheltered situations. Timber line is located at about 9,000 feet. Above this elevation tree growth is practically absent.

The boundary lines of these zones are not always clearly defined. Usually there is more or less overlapping where one belt adjoins another.

For camping purposes the yellow pine-sugar pine forest is the most popular. It is comparatively accessible; wood, water, and horse feed are easy to get; and there is plenty of fish and game. The fir belt also contains delightful camping places and rather more picturesque scenery than is found at lower elevations. The Tahoe region and the Gold Lake country on the Plumas National Forest are examples of the fir type of forest. The Calaveras big-tree grove, in the Stanislaus National Forest, is located in the yellow pine-sugar pine type.

The foothills are attractive only during the rainy season, being hot, dusty, and lacking water during the summer. And the high summits are too bleak for anything more than short mountaineering excursions from camps located at lower levels.

The National Forests in California comprise 20,339,337 acres of Government land. The private holdings of timberland within the State are chiefly within or adjacent to the National Forests. Many owners are cooperating with the Government in protecting their forests from fire.

In the southern California Forests are large brush areas. The chief purpose in protecting these is to conserve the water supply upon which thousands of acres of valuable land depend for irrigation. The timbered portions are protected not only for the sake of the water supply, but also in order to perpetuate the supply of timber. The stand of timber on Government land within the National Forests of California amounts to 120,000,000,000 feet board measure. It consists chiefly of western yellow pine, sugar pine, Douglas fir, white and red fir, and incense cedar.

HOW THE FORESTS ARE ADMINISTERED.

The Forest Service of the Department of Agriculture administers the National Forests. It protects them from fire and other destructive agencies. It builds roads, trails, telephone lines, bridges, and other works to make them accessible. It conducts the sale and oversees the cutting of mature timber in accordance with the principles of forestry. It regulates the grazing of live stock in a way to improve the range and protect the settler and home builder from unfair competition in its use. It issues permits for the development of water power and for the construction of hotels, dwellings, stores, factories, telephone lines, conduits, public roads, reservoirs, power transmission lines, and the like.

The resources of the National Forests are not locked up. The timber, water, and pasture are for the use of the people, and the minerals are open to development just as on unreserved public land.

Each National Forest is in charge of a supervisor, who plans the work on his Forest under the instructions of the district forester and supervises its execution. His headquarters is located in a town conveniently situated with regard to his Forest. The work on the ground in the supervision of timber sales, grazing, free use of timber, special use and other contracts and permits, the carrying out of the protection and improvement

plans, and other administrative activities are performed by rangers. Each Forest is divided into ranger districts with a ranger in charge of each. The average ranger district has about 60,000 acres, but some are much larger.

Receipts from the sale of National Forest resources in California amount to about \$280,000 annually. Twenty-five per cent of all such receipts go to the counties in which the Forests lie, to be used for schools and roads—amounting in this State to about \$65,000 annually; and an additional 10 per cent of the receipts, amounting to \$25,000, is spent on roads and trails constructed primarily for the benefit of settlers within the Forests.

Most of the forest rangers are also deputy State game commissioners. They assist the California Fish and Game Commission in enforcing the game laws, stocking streams with fish, and destroying predatory animals. Nearly 800 mountain lions, coyotes, and wildcats are killed in California by forest officers each year.

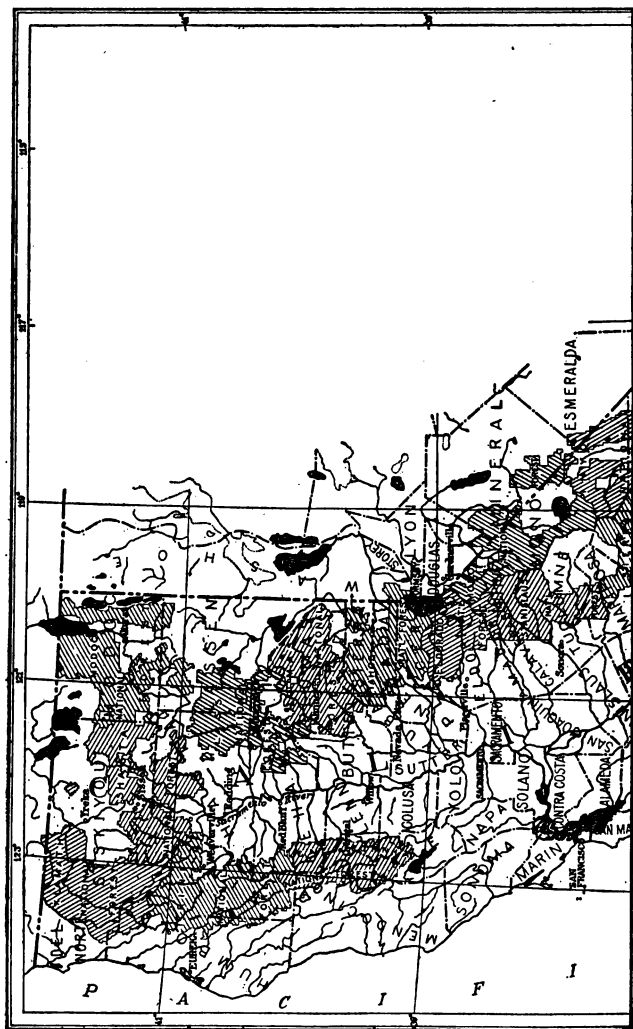
Forest officers extinguish in the average year about 1,100 forest fires in California. Approximately 85 per cent of these are discovered and controlled before they reach a size of 10 acres. The remaining 15 per cent cause an average loss of more than \$100,000 annually. Practically all the serious fires are caused by human agency and would not occur if proper precautions were taken by those who cause them. Inexperienced campers are responsible for most of the preventable fires.

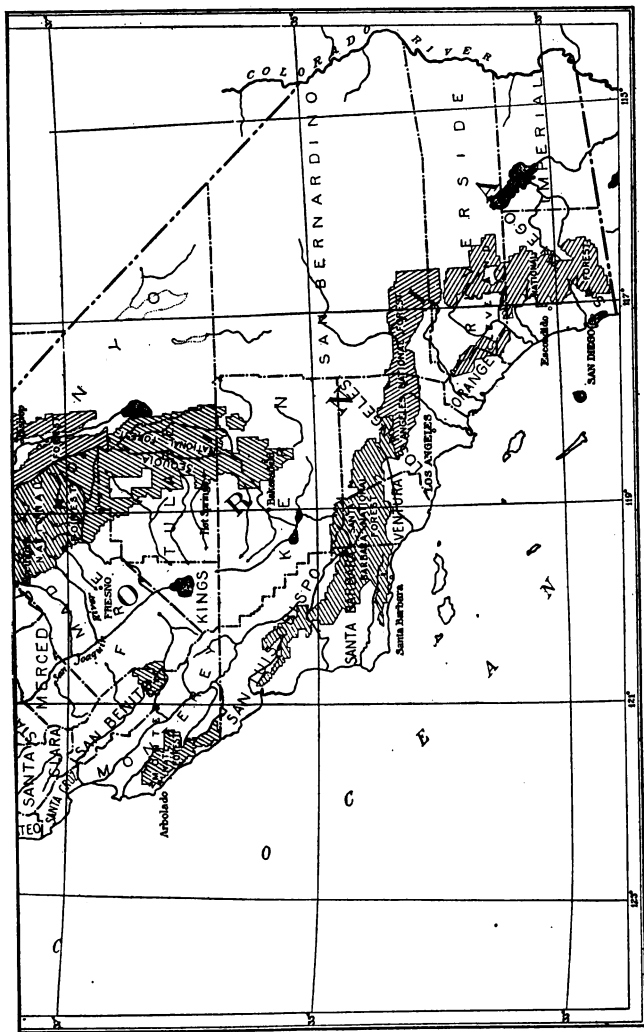
INDIVIDUAL NATIONAL FORESTS.

The following are brief descriptions of each of the National Forests in California. The map on pages 10 and 11 should be referred to for their location.

KLAMATH NATIONAL FOREST.

The Klamath National Forest contains 1,688,720 acres. It lies mostly in western Siskiyou County and is drained by the Klamath River, from which it takes its name. The Klamath





River has numerous tributaries, of which the most important are the Shasta, Scott, and Salmon Rivers, which flow into it from the south, and Indian Creek, which flows from the north. It is a rough, mountainous country, portions of it being very difficult to travel.

Yreka is the principal starting point and is also the Forest headquarters. It is on a branch railroad which leaves the Southern Pacific at Montague. There are wagon roads down the main river as far as Happy Camp, down the Scott River to its mouth, and down the Salmon as far as the Forks of Salmon. From the west side the Forest can be entered by a road up the Klamath from Humboldt County. Much of the Forest is inaccessible except by pack outfits.

Fish and game are plentiful and camp sites are numerous.

The Forest contains 14,873,391,000 feet of merchantable timber, consisting mainly of yellow pine and Douglas fir. It provides forage every year for 8,000 head of cattle and horses and 2,600 head of sheep, goats, and hogs.

TRINITY NATIONAL FOREST.

This Forest is situated chiefly in Trinity County and is drained by the Trinity River, the largest tributary of the Klamath. It has an area of 1,746,020 acres.

Its principal town is Weaverville, which is also the Forest headquarters. Weaverville is 50 miles by stage from Redding on the Southern Pacific. The Forest is crossed east and west by the Red Bluff-Eureka State highway, and there are roads north and west from Weaverville. Many of the more interesting portions of the Forest are accessible only to pack animals.

Hunting and fishing are excellent in nearly all portions of the Forest.

The Forest contains 10,879,826,000 feet of timber, chiefly yellow pine and Douglas fir. The annual growth of forage is sufficient for 11,800 cattle and horses and 19,850 head of sheep, goats, and hogs, which graze under permit.

CALIFORNIA NATIONAL FOREST.

This Forest comprises the interior ridges of the Coast Mountains south of the Trinity National Forest. It contains 1,061,000 acres and occupies portions of Mendocino, Tehama, Glenn, Colusa, and Lake Counties. The range divides the Forest north and south; the western slopes draining into Eel River and the eastern slopes into Stony Creek, Thoms Creek, and other tributaries of the Sacramento.

Fishing streams are numerous and game is abundant.

The Forest is accessible on the east side from points on the Southern Pacific between Colusa and Corning and on the west side from Hopland, Ukiah, Willits, and Dos Rios on the Northwestern Pacific. Willows is the Forest headquarters during the winter. In summer the office is moved to Alder Springs (Oriental post office).

The Forest contains 6,500,208,000 feet of timber and provides forage for 6,200 head of cattle and horses and 59,000 head of sheep and hogs.

SHASTA NATIONAL FOREST.

The Shasta lies mostly in Siskiyou County, taking in also portions of Shasta and Trinity. The eastern portion drains southward into the Pit and the McCloud Rivers, the central portion into the Sacramento, and the western portion includes the headwaters of the northernmost branch of the Trinity River.

The Forest contains 1,586,880 acres, of which 828,941 acres are owned by the Government. Throughout most of the Forest alternate sections are included in the Central Pacific land grant.

The Forest contains merchantable Government timber to the amount of 4,783,424,000 feet. It provides forage annually for 25,200 head of sheep, goats, and hogs and 9,600 head of cattle and horses.

The Shasta Forest is crossed north and south by the Southern Pacific (Shasta route), and may be entered from a number of

stations on this road between Redding and Gazelle. The Forest headquarters is at Sisson. This is also the junction point for the McCloud River Railroad, which extends easterly for 50 miles. Another branch railroad leaves the main line at Weed, running northeast to Klamath Lake.

Wagon roads parallel the railroad lines. Additional roads extend from Redding northeast into the Pit River country, from Delta into Trinity County, and from Gazelle into northern Trinity.

The Forest takes its name from Mount Shasta, one of the highest mountains in the United States, with an elevation of 14,380 feet.

MODOC NATIONAL FOREST.

The Modoc lies in Modoc and northern Lassen Counties. It comprises 1,578,200 acres. The western portion is an interesting lava-bed country of comparatively low relief and with but little water. Parts of the lava beds, however, contain excellent timber. The eastern portion of the Forest includes the Warner range, which slopes westward to Goose Lake and eastward to Surprise Valley, and which contains water in abundance.

The principal starting point is Alturas, which is also the Forest headquarters. It is on the Nevada-California-Oregon Railway, which leaves the Southern Pacific (Ogden route) at Reno, and leaves the Western Pacific at Doyle.

The Forest is generally open in character. Wagon roads are numerous, and hunting and fishing are excellent.

The Forest contains 2,975,337,000 feet of timber and forage for 41,300 head of cattle and horses and 61,300 head of sheep and goats.

LASSEN NATIONAL FOREST.

The Lassen is located in Shasta and Lassen Counties. It drains northward into the Pit River and westward into the Sacramento. A portion also drains eastward into Honey Lake.

The Lassen contains 1,397,000 acres. It takes its name from Mount Lassen, which in May, 1914, after many years of quiet, resumed activity as a volcano. The Forest contains 11,662,000,000 feet of timber, much of it quite accessible. It yields forage for 38,000 head of sheep and goats and 12,500 head of cattle and horses.

The winter headquarters are at Red Bluff, on the Southern Pacific. During the summer the Forest is administered from Mineral, which is on the stage road from Red Bluff. Roads from Redding enter the northern portion of the Forest; and stage roads also leave the Western Pacific at Keddie. A branch of the Southern Pacific, which leaves the main line at Fernley, Nev., gives access to the eastern portion.

PLUMAS NATIONAL FOREST.

This Forest drains chiefly westward into the Feather River. It lies mostly in Plumas County, including also portions of Butte and Lassen, and contains 1,433,600 acres.

It is one of the most accessible of all the Forests, being traversed east and west by the Western Pacific Railroad. The headquarters are at Quincy (on a short spur from the main line; junction point, Marston), and this is the principal starting point for camping trips. There are, however, numerous stations on the railroad, any one of which will serve as a starting point. Hunting and fishing opportunities are unsurpassed, and enjoyable camping places are innumerable.

The Plumas contains 14,871,302,000 feet of timber, some of which is the most accessible to market of any belonging to the Government. Live stock to the number of 14,400 head of cattle and horses and 75,700 head of sheep and goats graze each year under Government permit.

TAHOE NATIONAL FOREST.

This Forest is named from the famous lake which lies in the southeastern corner of it. It includes portions of Sierra, Butte,

Yuba, Nevada, and Placer Counties, and crosses the California line into Washoe County, Nev. It contains 1,210,500 acres, less than half of which is owned by the Government.

The drainage is chiefly to the west into the Sacramento River, the portion of the Forest draining eastward into Nevada being comparatively small. The principal streams are the Yuba, Bear, and American Rivers.

The Southern Pacific (Ogden route) crosses the Forest east and west. There are branches at Colfax for Nevada City, at Boca for Loyalton, and at Truckee for Lake Tahoe. One route of the Lincoln Highway goes through Auburn, Emigrant Gap, and Donner Pass. Further north a road from Oroville crosses into Sierra Valley and connects with roads to Nevada and Oregon.

The headquarters of the Tahoe Forest are at Nevada City. The Forest contains 6,991,985,000 feet of Government timber and provides forage for 7,800 head of cattle and horses and 59,500 head of sheep and goats.

ELDORADO NATIONAL FOREST.

This Forest is chiefly in Eldorado County, from which it takes its name. Its headquarters are at Placerville, which is on a branch line leaving the Southern Pacific at Sacramento. The eastern end of the Eldorado may be reached by train and steamer via Truckee and Tahoe. One route of the Lincoln Highway from Reno touches the southern end of Lake Tahoe and traverses the Eldorado Forest through the American River Canyon.

The Eldorado contains wonderful camp sites, and hunting and fishing are excellent. The Government timber amounts to 4,658,702,000 feet, containing an unusually large proportion of sugar pine. Live stock to the number of 10,000 head of cattle and horses and 17,200 head of sheep and goats pasture on this Forest each year.

STANISLAUS NATIONAL FOREST.

This Forest takes its name from the Stanislaus River, which is one of the principal drainage systems. North of this river is the Mokelumne watershed and south of it are the Tuolumne, which flows through the Hetch Hetchy Valley, and the Merced, which flows through the Yosemite.

The Forest includes portions of Calaveras, Alpine, Tuolumne, and Mariposa Counties. The northern portion of the Forest extends eastward to the main crest of the Sierras; the southern portion is bounded on the east by the Yosemite National Park.

The headquarters of the Stanislaus are at Sonora, on the Sierra Railway, which leaves the Southern Pacific and the Santa Fe at Oakdale and Riverbank, respectively. There are State highways which cross the summit into Nevada, one going by way of Long Barn and Mono Pass and the other, to the north, going via Murphys and the Calaveras Bigtrees. The Sierra streams flow through considerable canyons, and roads crossing them are infrequent. The automobile road to the Yosemite via Big Oak Flat traverses the Stanislaus Forest.

The Stanislaus comprises 1,136,500 acres. The stand of timber amounts to 9,406,196,000 feet, and the forage supports 17,000 head of cattle and horses and 12,250 head of sheep and goats.

Hunting and fishing are excellent and camping places numerous.

SIERRA NATIONAL FOREST.

This Forest includes the west slope of the Sierras from the Merced River southward to the North Fork of Kings River, with the exception of the area occupied by the Yosemite National Park. Portions of Mariposa, Madera, and Fresno Counties are included.

The principal watersheds are those of the San Joaquin and Kings Rivers. These rivers with their tributaries, as well as

many mountain lakes, have been amply stocked with trout, and fishing is everywhere excellent.

The Sierra contains 1,743,000 acres. Its headquarters are at Northfolk, in Madera County, reached by stage from Friant on a branch line out of Fresno. The San Joaquin & Eastern Railway, which leaves the main line at El Prado, leads into a beautiful camping country. Wagon roads lead in to the Forest from Madera and Fresno. The automobile road to Wawona runs from Raymond via Miami, passing within 2 miles of the Mariposa Grove of Big Trees.

The Forest contains 14,654,000,000 feet of merchantable timber and provides forage for 15,000 head of cattle and horses and 21,000 head of sheep and goats.

SEQUOIA NATIONAL FOREST.

This Forest covers the western flank of the Sierra Nevada range from Kings River south to the Tehachapi, including the watersheds of the Kaweah and Kern Rivers. The southern portion was formerly managed separately as the Kern National Forest. The Forest as at present consolidated lies in Fresno, Tulare, and Kern Counties, and contains 2,626,590 acres. Its headquarters are at Hot Springs, Tulare County, reached by stage from the railroad at Ducor or Porterville.

Kern River Canyon, one of the most remarkable canyons in the Sierras, can be reached by pack trips from Hot Springs. It is also accessible from Isabella, to which point there is a stage line from the railroad at Callente.

For Kings River Canyon the stage may be taken from the railroad at Sanger to Hume, thence by trail into the canyon. Mount Whitney, the highest point in the United States, is on this Forest, which also includes within its boundaries the Sequoia and General Grant National Parks.

The Forest contains 12,834,497,000 feet of timber and provides forage for 30,150 head of cattle and horses and 10,950 head of sheep and goats.

MONO NATIONAL FOREST.

This Forest lies on the eastern slope of the Sierras in Alpine and Mono Counties. Its headquarters are at Gardnerville (Minden Station), Nev., on a branch road from Reno. Carson and Walker Rivers are the principal streams.

The area of the Forest is 883,150 acres. Its timber amounts to 600,000,000 feet, and it provides pasture for 4,630 head of cattle and horses and 67,000 head of sheep and goats.

State roads cross the main Sierras, one into the Yosemite from the vicinity of Mono Lake, another into the Calaveras Bigtrees by way of Markleville, and a third into the Stanislaus Forest over Sonora Pass. There is also a road from Gardnerville direct to the southern end of Lake Tahoe which connects with the Lincoln Highway for Sacramento.

INYO NATIONAL FOREST.

This Forest lies east of the Sierras in Inyo County. It covers the entire watershed of Owens Valley, a portion of which furnishes the water supply of the city of Los Angeles.

Bishop is the headquarters, reached by rail from either Mohave or from Reno.

Trails lead from Bishop, Big Pine, Independence, and other points across high passes into the most scenic portions of the high Sierras. The Upper Yosemite may also be reached from this side.

The Inyo contains 1,337,780 acres. Its timber amounts to 450,000,000 feet, and its forage accommodates 5,500 head of cattle and horses and 30,000 head of sheep and goats.

MONTEREY NATIONAL FOREST.

This Forest is in two parts, one in Monterey County, whose function is to protect the watershed of the Salinas River, and the other in southern San Benito County. The headquarters are at Arbolado, on the Big Sur River near its mouth.

The Forest includes 501,150 acres. The timber is confined chiefly to the higher elevations on the seaward slopes and is estimated at 480,000,000 feet.

Grazing is provided for 2,250 head of cattle and horses and 2,500 head of sheep and goats.

SANTA BARBARA NATIONAL FOREST.

This Forest comprises the brushy ranges of San Luis Obispo, Santa Barbara, and Ventura Counties, and the western portion of Los Angeles County. The streams protected, although comparatively small, are of great importance in supplying water for irrigation and domestic purposes. The Forest contains 2,014,960 acres. The headquarters are at Santa Barbara.

The stand of timber amounts to 1,070,500,000 feet. The forage crop supports 8,000 head of cattle and horses and 3,000 head of sheep and goats.

ANGELES NATIONAL FOREST.

The watersheds comprised in this Forest furnish water for irrigation and domestic purposes to the San Gabriel and San Bernardino Valleys. The canyons are short, steep, and, except where fire has destroyed the cover, brushy. Tree growth is confined to the canyon bottoms, and a commercial forest is found only at high elevations.

This Forest is much used by campers, and especially by picnickers, since it is easily accessible to a very large population. On account of the extreme difficulty of fighting brush fires when once they are allowed to start, campers on the Forest are required to secure permits before lighting camp fires. These permits are supplied by the forest officers without charge.

The Angeles contains 1,165,300 acres, with a stand of timber of 1,299,765,000 feet, and has a grazing capacity of 4,100 head of cattle and horses. The Government is assisted in protecting the Angeles by contributions from the State and from associations of water users.

CLEVELAND NATIONAL FOREST.

The Cleveland Forest is in two parts. One occupies a small area about Santiago Peak, and the other includes the San Jacinto, Cuyamaca, and Laguna Mountains. The principal function of the Forest is the conservation of water and the prevention of erosion and of silting. The Forest headquarters are at Escondido, San Diego County.

The Forest includes 1,571,800 acres, of which 901,667 are Government land. The stand of timber, which is confined to the highest elevations, amounts to 678,000,000 feet. The forage supports 3,500 head of sheep and goats and 4,000 head of cattle and horses.

The Cleveland abounds in excellent camping places, especially in the San Jacinto region, reached from Hemet or from Banning, and in the Cuyamaca and Laguna Mountains. Roads are numerous.

OUTFIT.**CLOTHING, ETC.**

In outfitting for forest travel the following list will serve as a guide:

CLOTHING.

Old business suit; or khaki, whipcord, or overall material. Mackinaw or sweater.

Underwear, medium weight.

Socks, medium weight, two pairs being worn; or one pair heavy. Shirt, flannel or khaki, light or medium weight, half size larger than usually worn.

Shoes, stout, easy, with soles heavy enough for Hungarian nails; sneakers for camp.

Leggings, canvas or leather; woolen puttees unsuitable to brush.

Boots, instead of shoes and leggings, if desired.

Gloves, "buckskin."

Hat, moderately wide brim, felt or cloth.

BEDS.

Air beds are comfortable, where they can be carried, since they can be placed even on bare rocks. Mattresses are usually too bulky except possibly for wagon trips. In the fir forests a comfortable bed can be made from fir boughs by laying sprays about 2 feet long overlapping in courses, the big ends of each course being covered by the small ends of the next course. In the pine forest, pine needles, raked up before building the fire and with the cones removed, will make a comfortable bed.

BEDDING.

The most serviceable is a quilt of elderdown or wool with an extra covering of denim. The quilt can be sewed or pinned with blanket pins along the bottom to form a sleeping bag. If blankets are chosen, it should be borne in mind that two light ones are warmer than a single heavy one.

A 7 by 7 foot, 10-ounce canvas when folded will make a ground cloth and an extra cover and is also useful as a pack cover.

CAMP EQUIPMENT.

Camp equipment used by the Forest Service in outfitting fire crews is shown in the following list. An outfit for five men is given:

Knives, table	7
Forks, table	7
Teaspoons	7
Spoon, stirring	1
Plates	7
Cups	7
Milk pan (dish up)	1
Dish pan	1
Fry pans, small	3
Stew kettles, half-gallon	2
Meat fork	1
Canvas water pail, 2-gallon	1
Butcher knives	2
Stewpans, assorted	2
Can opener	1
1-gallon coffeepot	1
Dutch oven	1
Lantern	1

To the foregoing may be added :

Washbasins.
Pepper and salt boxes.
Oilcloth for table.

Miscellaneous camp equipment :

Shovel.
Axes and extra handles.
Saw.
Hatchets.
Assorted nails.

Canteens.
6-inch files.
Whetstone.
Rope and twine.

RATIONS.

The following ration list is used by the Forest Service as a guide in subsisting fire fighters on the fire line and may be of service to campers in outfitting for camping trips. The list shows the amounts of various articles required to subsist 10 men one day. The requirements of one man for 10 days will be approximately the same, and supplies for any number may be computed from the figures given :

Forest Service fire crew ration list—10 men, one day.

Meat alone :

Fresh meat.....	pounds..	20
Canned or cured meat.....	do.....	12

Meat combined :

Fresh meat.....	do.....	10
Canned or cured meat.....	do.....	6

Bread, crackers, or flour :

Bread.....	pound loaves..	9
Crackers.....	pounds..	6
Flour.....	do.....	8

Baking powder (if above amount of flour is used).....	do.....	$\frac{1}{2}$
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Lard.....	do.....	1
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Sugar.....	do.....	4
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Sirup.....	quarts..	1
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Coffee, ground.....	pounds..	2
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Tea.....	do.....	$\frac{1}{2}$
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Milk, canned.....	10-cent size cans..	3
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Butter.....	pounds..	2
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Fruits:

Dried.....	pounds.....	2
Canned.....	quarts.....	3
Rice.....	pounds.....	2
Beans.....	do.....	3
Potatoes.....	do.....	10
Onions.....	do.....	1
Tomatoes, canned.....	large cans.....	3
Macaroni.....	pounds.....	1
Cheese (American).....	do.....	2
Erbwurst.....	do.....	$\frac{1}{2}$
Pickles.....	quarts.....	$\frac{1}{2}$
Salt.....	pounds.....	1
Pepper.....	ounces.....	2
Dish towels (cheesecloth).....	yards.....	3
Twine.....	ball.....	1
Hand towels.....	number.....	3
Candles.....	do.....	3
Soap (hand, Sapollo, and laundry).....	bars.....	2
Matches.....	boxes.....	1
Paper bags.....	number.....	12

Total weight, 138 pounds.

CAMP FIRES.

(See illustrations on pp. 25 and 26.)

Camp stoves should be taken whenever they can be transported. They are safer than open fires, more convenient, require less fuel, and do not blacken the cooking utensils. Collapsible sheet-iron stoves may be obtained.

In the absence of a stove an open fire must be built. A safe and serviceable fireplace can be made of rocks placed in a small circle so as to support the utensils. (Figs. 4 and 5.) Where rocks are not obtainable, poles may be used as in figure 2.

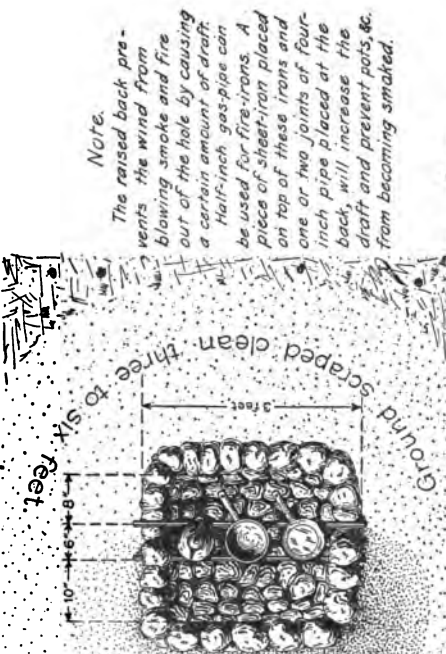
For permanent camps it pays to build a stone fireplace. One is shown in the illustration. A piece of sheet iron will prevent the blackening of the pans and makes a better draft.

For temporary camps the fire should be built as follows:

Dig a hole about a foot deep and about 3 or 4 feet in diameter. Shovel away the side toward the wind. Lay green poles across

Details of Camp Fire-Place Construction.

Fig. 1.



Note.

The raised back prevents the wind from blowing smoke and fire out of the hole by causing a certain amount of draft. Half-inch gas-pipe can be used for fire-irons. A piece of sheet-iron placed on top of these irons and one or two joints of four-inch pipe placed at the back, will increase the draft and prevent pots, &c. from becoming smoked.

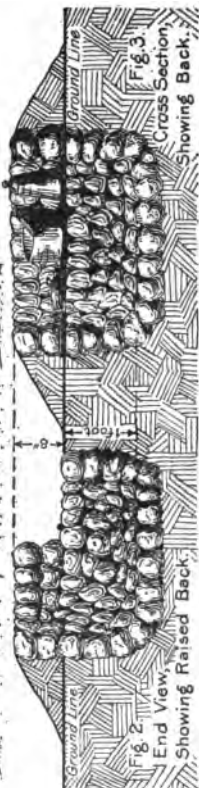


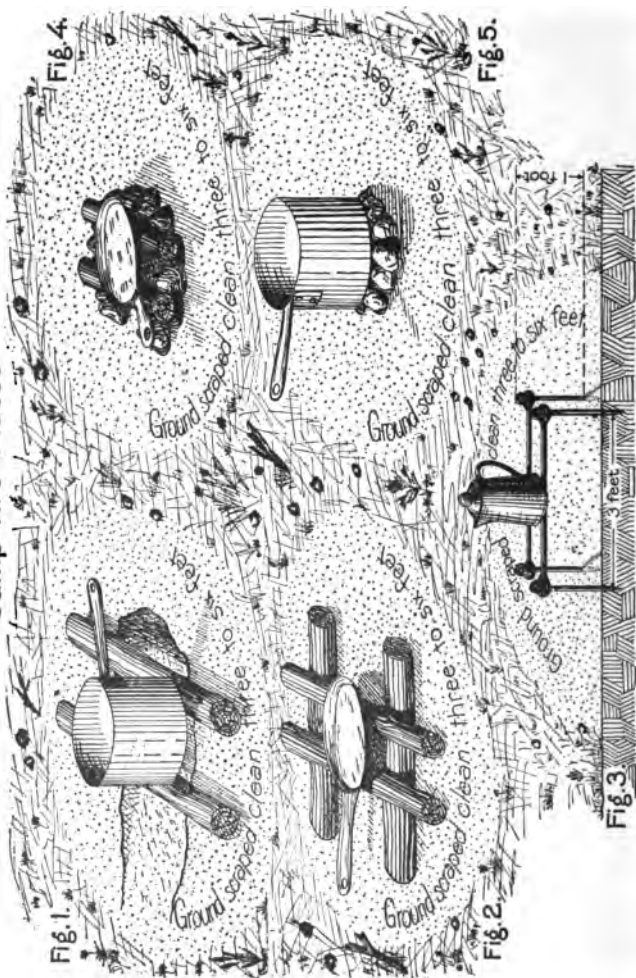
Fig. 2.

End View, Showing Raised Back.

Fig. 3.

Cross Section, Showing Back.

Camp Fire-Places.



the hole to support the pots and pans, and build the fire underneath. (Fig. 1.)

Fire irons are often a great convenience. A piece of three-eighths-inch round iron 4 feet long is bent at right angles a foot from each end and the ends are sharpened. Two of these irons are placed side by side, the ends are driven into the ground and the fire kindled beneath them. Instead of being made in one piece, the pegs and crossbars may be connected by rings in the ends. (Fig. 3.) They will then fold and be easier to pack.

Camp fires should never be larger than necessary, and the utmost care should be taken to prevent sparks from being carried into the neighboring forest. Clear away the litter for a considerable space about the fire. And be sure to **put the fire out** before you leave it.

A shovel is nearly as important a tool as an ax in camping. Do not count on finding one along the way, but put one in your outfit.

During wet weather look for kindling in burned sugar pine or yellow-pine butts or in pine knots. The under side of a leaning tree will usually contain dry material. Dead branches—of manzanita, etc.—that have not yet fallen are drier than those on the ground. Bark from fir snags is excellent fuel.

Where matches are scarce or when the weather is stormy, first light a candle and kindle your fire from that.

CAMP COOKERY.

It is difficult to pack into camp very many different kinds of foods, and the camper is recommended to secure variety in his menu by learning to cook staple articles in different ways rather than by stocking up with a varied assortment. Directions for preparing the ordinary articles of camp fare are given below:

Coffee.—Fill the pot with fresh water. When it comes to a boil stir in coffee previously moistened with warm (not hot) water. Cover closely. Let it boil up for two minutes, stirring

from the sides and top as it boils up. To clear it, remove from the fire and dash over the surface a cup of cold, fresh water. Or, put the coffee, dry, in the pot; stir it while heating; then pour over it 1 quart boiling water to each ounce of coffee, and set the pot where it will keep hot but not boil. After standing 10 minutes it is ready to drink.

Tea.—Bring fresh water to a hard boil. Fill the teapot with boiling water. When the pot is thoroughly heated, pour off the water and put into the pot 1 teaspoonful of tea for every cup that is to be drawn and 1 for the pot. Then pour on the boiling water and set the covered pot near the fire to draw but not to boil. Green tea generally requires 5 minutes; Oolong tea 8 minutes; English breakfast tea 15 minutes.

The faults commonly committed in making tea are as follows: The water is flat from having boiled too long; the water is only hot and not boiling; the teapot is not heated before putting in the tea; the tea is boiled instead of drawn (no tea should be boiled); the tea is made too long before it is to be drunk.

Baking-powder bread.—Mix 1 quart flour, 1 teaspoon salt, 4 teaspoons baking powder.¹ Stir in enough cold water to make a thick batter. Mix rapidly and pour into Dutch oven. Bake until no dough adheres to a sliver stuck into the loaf.

Frying-pan bread.—Mix 1 cup flour, 1 tablespoon sugar, 1 teaspoon salt, 3 teaspoons baking powder, and stir in water enough to make a thick dough. Pour into hot, greased frying pan and place near fire. As soon as it sets, prop the pan nearly erect before the blaze. When brown on one side turn it over.

Flapjacks.—Two cups flour, half teaspoon salt, and 4 teaspoons baking powder. Water to make a thin batter. Grease frying pan with lard or bacon rind and fry cakes when pan is smoking hot. Prepared pancake flours are often satisfactory and have directions printed on the package.

Corn bread (unleavened).—Corn meal 1 quart, salt 1 teaspoonful; mix rapidly with boiling water and stir till it drops lightly from the spoon. Bake in Dutch oven or in thin cakes in a frying pan.

¹ In using baking powders, follow the directions on the package, since different brands vary in strength.

In using *Dutch ovens* care should be taken that the oven and lid are quite hot before dough is placed in them for baking. During the preparations for baking the oven and lid should be heated over the fire. When a good mass of coals has been obtained, the dough should be placed in the heated oven (the bottom having been greased) and the lid put on. The oven should then be embedded in the coals and the lid covered with coals and hot ashes.

Instead of a Dutch oven two pans may be used, one being large enough to fit snugly over the other as a cover. Plenty of ashes and earth should be piled on top or the bread will burn.

Fried fish.—Clean and wipe the fish dry, rub it over with dry, sifted flour; put into a frying pan enough dripping to well cover the fish; when this is hot, put in the fish and fry both sides a clear golden brown. Just as the fish is turning brown sprinkle it lightly with pepper and salt.

Fried steak.—Cleanse the steak but do not put it into water. Have the frying pan very hot and dry and lightly powdered with salt; put in the steak, cover it with a tin plate, and turn it often. When cooked put it on a hot dish and season with pepper and salt. The juices will then escape and furnish the gravy; or, have ready in a hot dish a half teaspoonful of salt, a quarter of a teaspoonful of pepper, a piece of butter or beef dripping not quite the size of an egg, add two tablespoonfuls of boiling water, mix well together, put the steak into it and turn it over once, so that both sides will be moistened with the gravy, and serve.

Prepare and broil mutton chops, venison, and pork steaks as above.

Meat prepared in this way is quite equal to that broiled in a gridiron, and this method does not waste the juices.

For broiling on a *gridiron*, prepare the steak as directed for cooking in a frying pan. Have ready a bed of live coals, and as soon as the gridiron (wiped clean) is heated put the steak on it, turning often. If the fire smokes or blazes from the dripping fat, withdraw the gridiron for a moment. It should cook in 15 minutes.

Salt pork and bacon should be soaked in cold water for an hour or two before broiling or frying. Ham may be covered with boiling water and soaked for half an hour before broiling.

Game.—The entrails should be taken out as soon as game is killed. If the meat is not to be cooked at once, hang it up in a cool, dry place. Birds should be kept in their feathers and animals in their skins.

Canned goods.—Before using canned goods see that the ends of the cans are sunk in. If the ends are swelled or bulgy, it usually means fermented contents and spoiled goods.

After a can has been opened pour contents immediately into enamel ware dish. Never leave food in the original cans.

In the process of canning all canned goods receive a cooking varying in length of time from five minutes to seven hours, according to the character of the goods, and but little further cooking is necessary.

Boiling.—At high altitudes water boils at temperatures too low to cook with, the decrease in atmospheric pressure lowering the boiling point. This decrease amounts roughly to 1 degree for every 555 feet of ascent. Thus, at 10,000 feet elevation the temperature of boiling water is only 194 degrees. Other methods of cooking are not affected by altitude.

Beans.—Wash and soak over night in cold water. Soft water is preferable; a little baking soda may be used to soften hard water. Drain and put the beans into a pot with enough cold water to cover them plentifully. To 2 quarts of beans add 1 teaspoonful of bicarbonate of soda; cover and boil for 15 minutes. Remove the scum as it rises. Pour off the water; replace with boiling water. Cover and boil steadily for 2 or 3 hours, or until tender. Drain and season with butter, pepper, and salt.

Rice.—The rice should be thoroughly washed and then placed in a pot with plenty of water (latter at boiling point). Boil, without stirring the rice, for 20 minutes; throw into a colander, covering same, and let stand several minutes—this serving a double purpose, allowing rice to drain as well as steam.

The three cardinal points essential to a satisfactory result are: First, water boiling from start to finish; second, rice undisturbed while cooking; third, thorough draining.

In order to see whether or not rice is done, take out one of the grains and press it between the fingers; if well done it will mash easily and feel perfectly soft.

One pint of rice will swell to 3 pints when cooked and increase in weight from 14 ounces to 2 pounds.

One pound of rice contains about three and one-half times as much food as 1 pound of potatoes.

Stewed prunes.—Wash and pick over the prunes; put them to soak overnight in the water (cold) they are to be cooked in,

using only enough water to cover them. Put the prunes on the fire where they can just simmer during three hours. Do not use an iron vessel and do not let them boil hard. Keep closely covered.

Stewed, dried, and evaporated apples, apricots, and peaches.—These are prepared like prunes except that they require less cooking. Also, when these fruits are cooked put in plenty of sugar and cook five minutes longer.

During hot weather fruit is likely to sour when put to soak overnight.

Stew.—Into a kettle put a layer of meat (fresh, salt, game, etc.) and season, dredge with flour, then add a layer of potatoes, onions, etc., repeating this until the kettle is nearly full, as desired. Over all pour sufficient water to cover, and stew slowly from one to three hours, according to quantity. During the last hour stir in a quart of batter to thicken; season to taste, and serve hot.

Stew with canned meats.—Peel and slice the potatoes and onions; put them in the camp kettle, season with pepper and salt, pour in sufficient water to cover them, and stew gently, keeping the lid of the kettle closely shut until the potatoes are nearly cooked; then open the tins of meat, cut up the contents, and put into the kettle; let the whole simmer for 10 minutes and serve.

DISPOSAL OF REFUSE.

Burn all kitchen refuse in the camp fire; it will not affect the cooking. Burn everything—coffee grounds, parings, bones, meat, even old tin cans—for if thrown out anywhere, even buried, they may attract flies. Refuse once burned will not attract flies.

If burning is impracticable, dig a hole for the refuse; leaving the earth piled up on the edge, and cover every addition with a layer of dirt.

PACKING.

(See illustrations on pp. 34 and 35.)

In packing on animals a packsaddle is firmly cinched, the portions of the outfit are suspended on it, and the whole is secured by a rope with a cinch attached which is so tied as to bind the load to the animal.

The usual packsaddle is of the sawbuck type—consisting of two back plates, to which low crosstrees are bolted in the place of horn and cantle. Packsaddles should be double rig, with breast pad and crupper or breeching. It is quite necessary that the packsaddle should fit the animal that is to carry it, otherwise galls are almost certain to occur.

Unless kyacks are used the various articles, except bedding and the bulkier pieces, must be tied in sacks, which are suspended from the saddle by means of the sling rope. (See fig. 5.)

SLINGING.

Two half hitches are taken in the middle of the sling rope and dropped over the front crosstree. The ends are then looped over the rear crosstree to form the slings (C, C) in which the sacks are hung. The slings are adjusted to the proper position and kept there by taking a turn with the ends (D, E) around the sling loop. When both side packs have been slung, the ends of the sling rope are tied together across the center of the saddle.

The other sacks, if there are any, are then piled on. The bedding may be rolled up, forming a bundle, or it may be folded once and spread across the pack. Long, slender articles, like fishing rods, shovels, or rakes, should go on top of the load.

Kyacks are sacks furnished with a pair of loops to hook over the crosstrees. They are the size and shape of the case in which two 5-gallon coal-oil cans are packed, and are made of rawhide, leather, or canvas. Kyacks (also called "alforjas," or, in California, "alforkases") are especially convenient for packing numerous loose articles.

It is of particular importance that the two sides of the pack should be evenly balanced. The weights on the two sides should be as nearly the same as possible, but where the weight can not be evenly divided the heavier side must be slung higher. The balance may be tested by bearing down on one of the packs; if the load comes to rest immediately, the pack should be altered; but if it oscillates a time or two, it will do.

THE HITCH.

The load is made fast by means of the cinch rope or lash rope. The principle of practically all hitches is that any slack that may be left in the rope is at all times equally distributed.

For commercial or army pack trains the Government diamond hitch probably has no equal. But it is difficult to explain, hard to remember, and awkward to throw without a helper. There are various one-man, squaw, or Basco hitches, which for ordinary purposes are preferable. One of the simplest, which is in common use by the rangers, is illustrated on page 34. It may be thrown single handed.

Until some practice is obtained the packer should first set the hitch and tighten it afterwards, always pulling toward head or tail on a line parallel with the animal's backbone.

At the end of the first mile or so the pack should be examined, and, if necessary, the hitch should be tightened. This is particularly necessary if the lash rope is damp when the hitch is thrown, since the rope stretches on drying.

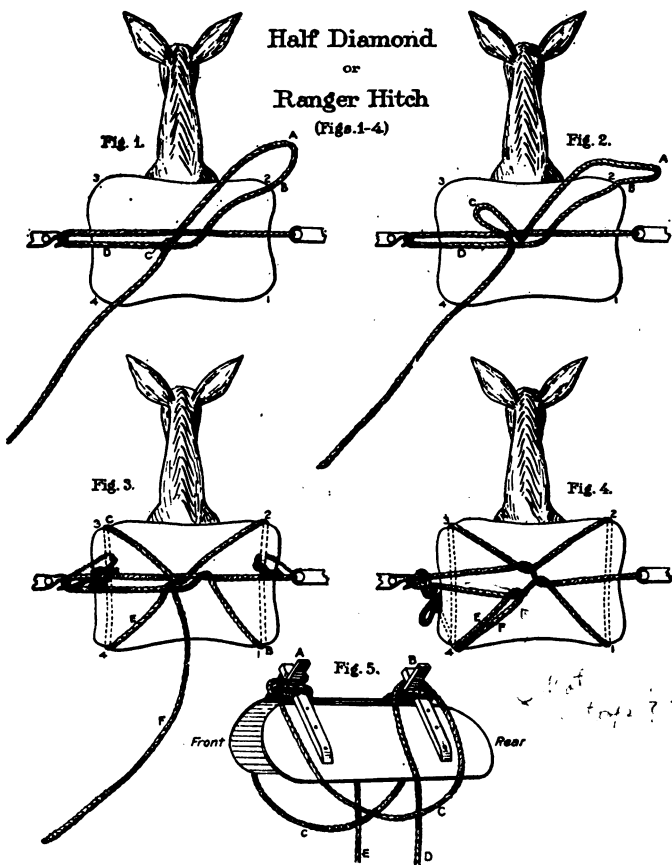
When stops are made for lunch or other purposes, the pack horses should be unloaded.

RANGER HITCH.

The cinch is thrown over the center of the pack from the near side. The packer reaches under the animal with his left hand, seizes the hook, pulls the cinch into position, and catches the rope in the hook. The loop A is then tucked under, and another loop is made by pulling out the portion of the rope at C. The cinch is now tightened by pulling up on the rope at D. The packer then goes to the off side, leads the rope B to the rear corner of the pack, and thence forward beneath the load. Standing at the horse's head he tightens it, pulling in line with the animal's backbone, and bracing knee or foot against the pack to get a purchase. Still keeping a strain on the rope with his left hand, with his right he reaches under the horse's neck,

Half Diamond or Ranger Hitch

(Figs. 1-4)



Method of Setting Sling Rope.

Bedding Hitch

Fig. 1.

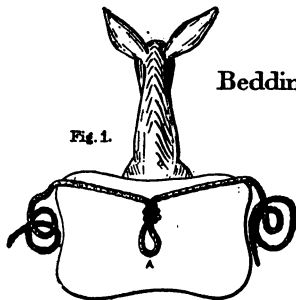


Fig. 3.

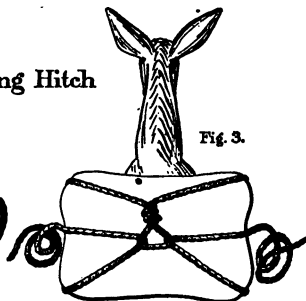


Fig. 2. Under Side of Pack.

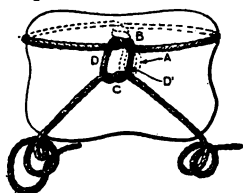


Fig. 4. Under Side of Pack.

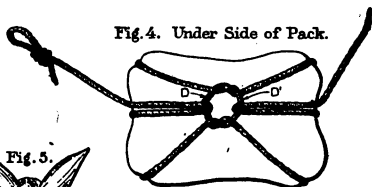
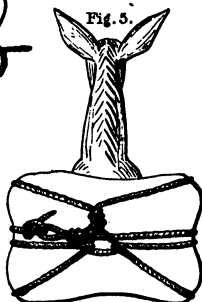


Fig. 5.



seizes the loop C, and takes up the slack. When this is done, he tightens from this side in the same manner. Then, still keeping a strain on the rope, he leads it to the rear corner on the near side, tightens there, keeps a strain at E with left hand, seizes F with right hand, tightens again, leads the rope down to corner 4, thence under the pack, and makes fast to the center ropes just above the cinch hook.

BEDDING HITCH.

For packing bedding together with a few cooking utensils or other articles, neither packsaddle nor cinch rope is required. The bedding is folded and laid full length across the riding saddle, the loose articles being placed on top beneath outer layers of bedding, and the hitch thrown as per diagram.

If the hitch is thrown by two packers, they can tighten as they proceed. A single-handed packer will have to set his hitch first and tighten afterwards.

This hitch forms a triangle on top of the pack and a diamond on the under side of it. If carefully thrown, it may be drawn very tight without any danger of injury to the animal.

Most conveniently thrown by two packers, one on each side. The loop A, about 8 inches in length, is tied in the middle of the rope and placed in front of the horn. The ends are led down on each side and tied in a simple knot, B, just behind the forelegs. Another knot, C, is then tied behind the first, but the two are not drawn together. The rope ends are then led one to each rear corner of the pack, and each is securely tucked into the loop. Thence each end is led directly down across its side of the pack, tucked under the strand D D and up again in the same line. Then a loop is made in the end of the rope on the offside, the near end is put through it, pulled tight and made fast.

On portions of the National Forests where feed is scarce or where stock grazed under Government permit is likely to con-

sume the forage needed for travelers' stock, pastures are inclosed in which saddle and pack animals may be certain to find feed. The location of these pastures may be ascertained from the rangers if they are not shown on the Forest maps. In general, however, the feed on the Forest ranges is sufficient to keep saddle and pack stock in good condition if they are permitted to get all they can at night. To keep them within bounds, picket ropes are sometimes used. These, however, are liable to cause accidents, rope burns, etc., and where the feed is at all scattered they do not enable the animal to cover a sufficiently wide area unless the picket pin is frequently moved.¹ Hobbles are more satisfactory and more generally used. Leather straps, which buckle about each forefoot just below the fetlock and are connected by a short chain, may be purchased. Satisfactory hobbles, however, may be made as follows:

Cut off about 5 feet of half-inch rope and unwind one strand. Double this strand, and tie the ends together in an overhand knot. Put the doubled rope around one forefoot just above the hoof and twist it loosely three or four times. Then place the other forefoot between the ends of the rope and secure by tucking the knot in one end through the loop in the other. If the hobbles have a tendency to chafe, place them above the fetlocks one night and below them the next time.

ACCIDENTS—FIRST AID.

First-aid packets should be included with the camp outfit; also a First Aid Manual, which should be studied before starting out. In case of any serious accident get to a telephone at once and send for a physician. Directions for preliminary treatment of some of the commoner accidents are given below:

Wounds.—To stop bleeding, apply pressure directly over the wound, either by the fingers or by means of a compress. The latter is preferable.

¹ In staking horses tie them by the foreleg, never by the neck.

If the bleeding can not be controlled by this method, apply pressure to the blood vessel which supplies the bleeding part, the pressure being applied always between the wound and the heart.

To make a tourniquet tie a strong bandage, handkerchief, necktie, etc., about the wounded part. Place a smooth pebble or similar hard substance directly over the blood vessel. Insert a stick within the bandage and twist it tight.

Burns.—Exclude air and keep parts absolutely clean. Treat with vaseline or olive oil. Lacking these, use a solution of baking soda.

Where large blisters are formed, remove the fluid before dressing. Prick near the edge with a needle that has been passed several times through a flame and gently press out the water.

Where the clothing sticks to the flesh, do not remove it forcibly. Cut it away as close to the burn as possible and soften with oil before removing it.

Fractures.—Send for a surgeon. It is not necessary that a broken bone should be set immediately. If it is impossible to obtain a surgeon at once, or if it is necessary to move the injured person, the parts should be bandaged with splints to keep them from moving. For splints use thin pieces of board a little longer than the bone and as wide as the injured part. They should be thoroughly padded with cotton, cloth, or moss.

Sprains.—The part should have absolute rest. Apply water as hot as can be borne. After the first day or two apply splints and bandages if necessary.

Sunstroke.—The skin is dry and hot, the breathing quick, and the heart action violent. Place patient on his back, with head slightly raised, in a cool, shady spot. Loosen clothing. Apply cold water, first to the head and then to body, until temperature has been reduced and consciousness returns.

Snake bite.—Use a tourniquet between the wound and the heart, loosening it from time to time. Cut the wound to allow

it to bleed freely. If whisky is administered, give it in small doses at frequent intervals rather than a large quantity all at once. The best treatment is hypodermic injections of potassium permanganate near the puncture, with strychnine given hypodermically or in tablets to keep up the heart action.

Poison oak.—Bathe with a saturated solution of baking soda. A decoction of manzanita leaves and bark will sometimes give relief.

Resuscitation of the apparently drowned.—Send for physician at once. Loosen clothing. The water must be removed from mouth, lungs, and stomach. Water and mucus may be removed from the mouth with the finger. To remove the water from throat and lungs, grasp the patient around the waist from behind and raise the body so that the head and feet hang down.

To induce artificial respiration.—Place the patient on his back. Draw the tongue forward and if necessary tie with a handkerchief. Kneel at the patient's head and grasp the arms below the elbows. Draw the arms upward and backward until patient's hands touch the ground behind his head and keep in this position while "one," "two," "three" are slowly counted. Then carry elbows downward slowly, doubling the forearm on the arm, pressing firmly against the chest. Rest a few seconds, and repeat about sixteen times to the minute. Do not give up for at least one hour and a half.

When signs of life appear, friction and rubbing should be applied, and tea, coffee, or whisky and hot water may be given.

FIRES AND FIRE FIGHTING.

The forest fire risk in California is excessive. The long dry season, the inflammable nature of the cover, and the habit natural to Californians of camping out during the summer tend to produce severe fire conditions. The matter of camping is mentioned because most fires are of human origin. The seasoned camper is by no means a source of fire danger; he is,

rather, a safety factor, since he knows that precautions must be taken and helps to instruct those who are less experienced. But until a camper has had at least a season's experience in the Forests he is apt to take unwarranted chances with camp fires, matches, burning tobacco, etc.

The fire organization on the National Forests includes measures designed to prevent, detect, and suppress fires. Absolute prevention is, of course, impossible; lightning causes a certain percentage of fires each year, and a few fires start in other ways that may be fairly called unpreventable. Among these are the breaking of transmission lines, the accidental burning of houses in the Forests, etc. There is also a theory very popular in California that broken bottles, by focusing the sun's rays upon inflammable material, are a frequent source of fires; but the theory has never been verified. During seven years in which accurate fire records have been kept in California not a single case of this sort has come to light.

Preventable fires can be prevented only by educating the public. This the Forest Service attempts to accomplish by various devices, but especially by giving currency to the Woodman's Six Rules:

(1) **Matches.**—Be sure your match is out. Pinch it before you throw it away.

(2) **Tobacco.**—Throw pipe ashes and cigar or cigarette stumps in the dust of the road and stamp or pinch out the fire before leaving them. Don't throw them into brush, leaves, or needles.

(3) **Making camp.**—Build a small campfire. Build it in the open, not against a tree or log or near brush. Scrape away the trash from all around it.

(4) **Leaving camp.**—Never leave a campfire, even for a short time, without quenching it with water and then covering it with earth.

(5) **Bonfires.**—Never build bonfires in windy weather or where there is the slightest danger of their escaping from control. Don't make them larger than you need.

(6) **Fighting fires.**—If you find a fire, try to put it out. If you can't, get word of it to the nearest United States forest ranger or State fire warden at once. Keep in touch with the rangers.

These rules have been compiled for the guidance of the public by observing the general practice of foresters and other woodsmen in their use of fire in the mountains. Most of them have been enacted into law, and the penalties for the violation of them are severe. Campers should observe them scrupulously.

The work of detecting and suppressing forest fires has been greatly systematized in recent years. Nowadays fires are reported mainly by lookouts, whose function is not to fight fires but merely to discover and report them. The lookouts are located on commanding peaks, and remain on duty continuously. They are equipped with the necessary instruments and housed in cabins, from the interior of which the entire area under protection can be kept in view. Each Forest has several lookouts. Where the same area is under observation from two or more, the location of a fire can be determined very accurately, even at a distance of many miles from either.

The lookout is in communication with the district ranger either by telephone or heliograph. Telephone service is the most certain and satisfactory, but heliographs are used in situations where other facilities are lacking or are too costly. On receiving a report from a lookout, the ranger in whose district the fire is located takes immediate steps to put it out. His assistants are stationed at various strategic points, each connected by telephone, and they remain within hearing distance of the bell. In fighting a forest fire it is as necessary to be prompt as it is in saving a burning house. For this reason the forest firemen are kept at their stations in constant readiness. This system has proved to be very economical. Instead of having large fires to fight, the majority of fires are kept to an area under one-quarter of an acre and are handled by one or two men at the most.

Where large fires occur, due to exceptional circumstances, large bodies of fire fighters may be required. These are, so far as possible, organized in advance, so that no time may be lost. They are recruited from near-by ranchers, stockmen, lumbermen, and even from settlements outside. Transportation facilities both for the men and for their subordinates are also arranged beforehand, and tools and nonperishable food supplies are cached in places where a demand for them is likely to arise.

In the more thickly settled portions of some Forests, especially where there are numerous occasional visitors from near-by towns, moving patrolmen are employed. These, by calling the attention of campers to the necessity for taking proper precautions, and even by their very presence, keep a great many fires from starting. They also attend to the extinguishing of such fires as occur, and in the case of large fires take charge of the fire fighting until relieved.

A few years ago the opinion was very prevalent in California that the entire Forest area should be burned over periodically in order to effect a general clean-up. This theory is now very largely discarded, and properly so. There are certain arguments in favor of it, but it is chiefly based upon conceptions that are fundamentally wrong. In the first place, although it appears to cost nothing, it is in reality an extremely expensive measure when performed effectively. Some irresponsible advocates of this theory—the so-called “light-burning” theory—assume that it is only necessary to touch off a piece of Forest at the proper season and that the fire will do its work without further attention. This is by no means the case. It is obvious that there are many areas that fire should be kept out of at all hazards, or if they are to be burned at all should be burned with extreme care. This means, then, that the fire must be kept under control, which would entail prohibitive expense as compared with the cost of keeping fires out entirely. One large tract of private timber in the northern Sierras was cleaned up in this fashion at a cost of 50 cents per acre. The owner believed firmly that

light burning was the proper way to protect his stand; but as a practical lumberman he recognized also the necessity of expensive control. At the same rate the expense of "light burning" the whole of the yellow-pine belt in California would amount to at least \$5,000,000.

But besides the prohibitive cost there are two other objections to this practice. One is that the young growth is inevitably destroyed; in fact, since thickets of young growth are specially inflammable, it is one of the objects of light burning to consume them. But the forests of the future can not be created all at once when they are needed. They require a development period of at least 100 years before they produce material fit to cut into lumber. Any system which protects the mature timber at the expense of the young growth which is to replace it violates the principles of forestry and, unless the sacrifice is absolutely unavoidable, of common sense as well. It was formerly argued that the sacrifice was necessary; that unless the *débris* which collected on the floor of the forest year after year was burned, unless the thickets of young growth were kept down, the final result would be a conflagration that nothing could control. This argument upon examination is found not to hold. The record of the Forest Service in California during recent years proves that very severe fire conditions can be handled without any considerable loss of timber.

But what is still more important, it is found by experiment that burning decreases the amount of litter not for a period of years but at most for an interval of only a few months. The litter upon the ground at the time of the burning is consumed, but is replaced with more than normal rapidity by the *débris* shed from the trees scorched by the fire.

In short, light burning, in order to make the forest safe against future fires, must not be "light," but must be a fire of exactly the sort that it is the object of the practice to prevent. Fortunately, the light-burning method is no longer advocated to any great extent.

HINTS ON FIRE PROTECTION.

The first thing is prevention. Bear in mind the Six Rules. Be particularly careful with camp fire, matches, and tobacco, since carelessness with these is punishable by law.

Scrape all inflammable material from around the fire before lighting it. Make a fireplace either by digging a hole or by piling up rocks. The fire will then not only be safer but will draw better.

Before leaving camp see that the last spark is extinguished. Pour water on the embers and then cover them with earth.

Don't make your fire too large. Large fires are not as convenient to cook by as small ones and are more trouble to put out.

If you discover a fire, go to it at once and put it out if you can. A small fire can be put out easily by throwing handfuls of earth, sand, or dust at the base of the flame. The flames may also be beaten down with sacks or with branches, but care must be taken not to scatter the fire.

If the fire is spreading too rapidly to be attacked directly, cut and scrape a trail some distance ahead of it. Do not back-fire; this is work for an experienced man. If a fire is serious enough to require this treatment, the work should be left to a ranger.

The best tools for fire fighting are the shovel, ax, and hoe or rake. In open pine forest very little ax work will be required. Shovel or rake a trail through the needles down to mineral soil, and guard the trail.

To stop a fire burning in brush the trail must first be cut with the ax and then scraped. The brush should be thrown to the side away from the fire. The litter may be scraped toward the fire.

Pick a route for the fire trail that will avoid brush patches if possible. The crest of a ridge is an excellent location, since the fire naturally checks at the top.

Do not give up because the fire is gaining headway or because you lack tools. The fire has already been reported by lookouts,

and rangers are hurrying to it properly equipped. Stay and help them; and in the meantime do what you can to keep it in check.

See that a fire is cold before you leave it.

Report all fires to the nearest forest officer.

Do not suppose that because a fire is merely burning in apparently worthless brush it is therefore doing no damage. Such fires are often the most serious.

GAME AND FISH.

The National Forests contain the principal habitats of all the important game animals of the west. No charge is made for hunting, fishing, or ordinary camping upon Government land within the National Forests, and their use as recreation grounds is encouraged. No permits are issued for game preserves or any use of land which would result in preventing or restricting lawful hunting or fishing. Since game in general is regarded as under State control, the Federal forest officers derive their authority in game protection from the State. They are not game wardens *ex officio*, but only after appointment as such by the proper State authorities. National Forest officers are, however, active in game protection; and in cooperation with the State Fish and Game Commission the forest officers on 27,000,000 acres of National Forest lands are fulfilling the duties of game wardens in California.

Licenses are required by the State for angling as well as for hunting. They may be obtained from forest officers who are game wardens.

Cards containing the California fish and game laws may also be secured, and the laws thereon should be strictly complied with.

The rangers know the best hunting country and the best fishing streams, and will be glad to furnish information to those who request it.

The principal big-game animal on the National Forests in California is the black-tail deer. The State Fish and Game Commission estimates that 30,000 deer are killed each year, more than half of this number by mountain lions and the remainder by hunters.

Deer winter in the foothills, ranging up to higher levels as the snow melts. During the early summer the bucks are often found in the open glades and meadows feeding on grass and tender shoots. Later they head for brushy areas and live off the browse furnished by oak, hazel, blue brush, and various other species. In the fall, in an oak country, they feed on acorns.

Since the best deer hunting is apt to occur during the height of the dry season, it is particularly necessary that hunters be careful not to set fires.

The bucks shed their horns during the winter, the new horns beginning to grow in early spring. During the summer these are in the velvet—tender, full of blood vessels, and unfit for mounting. Later the horns harden, the velvet is rubbed off, the hide changes color from "red" to "blue," and the buck reaches his prime condition. This season varies in different portions of the State from mid-August to October, being earlier the lower the elevation. As a general rule the bucks are in the best condition toward the close of the open season.

To transport a deer on a saddle horse throw a rope across the saddle, pulling a loop of it forward through each cinch ring. Place the buck across the saddle and put the head through one loop and the haunches through the other. Draw the ends of the rope tight, make a loop in one, reeve the other through it, and make fast.

To skin a deer head for mounting, cut the skin around the neck well down on the shoulder and breast. Then cut along the *upper* side of the neck to the top of the head. Thence make diagonal cuts, one to each horn. Cut off the ears close to the

skull, turn them inside out, and cut away the meat, leaving the cartilage. Skin carefully around the eyes. Cut the lips close to the skull, leaving them attached to the skin. Split them from the inside and fill the cut with salt.

Rub plenty of salt into the flesh side of all parts of the skin, and let it dry slowly in the shade or roll it up hair side in and ship at once to a taxidermist.

To butcher a deer hang it up by the hind legs, slit the skin along the middle of the breast and belly and to the end of the tail; then along the inside of each leg. Cut off the feet at the joints and peel off the skin. Cut through the wall of the abdomen without piercing the intestines; loosen the diaphragm at the back and sides; cut away the lower intestine close to the bone and empty out the entire contents of the carcass. Split the breastbone with a hatchet.

The best cuts of venison are the saddle and haunch.

To make jerked venison or "jerky" use lean meat cut into strips about one-half inch wide. Lay these side by side on a frame made of slats or poles supported about 4 feet from the ground and keep a small smoky fire going underneath until the meat is thoroughly dry.

Fresh meat should be hung up and protected from flies by cheesecloth.

MISCELLANEOUS.

Photographs.—Photographs taken in the shade of the forest require from 5 to 15 times longer exposure than those taken in the open.

Compasses.—One end of the needle always has a distinguishing mark, but manufacturers do not always mark the same end. Make sure which end of the needle points north and remember it.

Candle lanterns.—With the point of a hatchet blade cut slits about 2 inches long in the form of an X in the side of a lard

pail. A candle pushed into this aperture will be held steady, and the can will shade it from the wind and serve as a reflector.

To dry matches.—Carefully blot off as much water as possible with a soft cloth and then pass them through the hair a dozen times or so.

A shoulder pack can be improvised as follows: Take a grain sack and place a pebble an inch or more in diameter in each of the lower corners. Tie one leg of a pair of overalls to each of these corners. (The pebble prevents the knot from slipping off.) To close the sack tie the mouth of it and the waist of the overalls tightly with a cord. The legs make comfortable shoulder straps.

Chafed heels can be alleviated by rubbing soap into the socks. Also, by sticking adhesive tape on the bare heels.

Getting lost.—There is little danger of a person being lost in the California mountains during the summer. Usually the worst that can happen is the possibility of an uncomfortable night in the open. The realization that one is lost is, however, often accompanied by a panicky feeling that may hurry one into difficulties or even into accidents. Fight against this, and keep your head. Thirty minutes' calm thought will be worth more than hours spent in aimless rushing.

Don't try to travel after dark. Camp as comfortably as you can as soon as night comes on, no matter how near to camp you think you are.

You can always reach the settlements by traveling downstream. Some of the Sierra canyons are difficult going, and it may often be better to stick to the ridges. But make sure which way the stream is flowing and travel in the same direction.

Snow blindness.—Snow blindness may occur in mountain climbing on snow unless the eyes are protected with dark glasses. If these are unobtainable, daub a mixture of grease and charcoal on the cheeks just beneath the eyes.





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